

Field Notes

Tools and techniques for today's wildlife professional

Thermal cameras help track birds and bats near offshore wind turbines

With the growing popularity of wind power as a renewable energy source, an increasing number of turbine blades are spinning at offshore facilities, posing threats to birds and bats flying past. At a coastal site by Portland, Maine, researchers are testing how thermal camera technology can help track where these animals fly and how to reduce turbines' impacts on them.

The Department of Energy's [Pacific Northwest National Laboratory](#) is designing the system to shed light on both the turbines' direct impacts on birds and bats and the avoidance behaviors the animals exhibit around them. The equipment picks up the heat their bodies emit against the cooler background of the ocean and sky and displays these heat signatures on screens that biologists monitor. Because the system uses two small cameras with overlapping fields of vision, like human eyes, it can compute the animals' locations relative to the turbines in three dimensions. It can also detect the animals' movement at night and in low-visibility weather, unlike visual cameras.

"The advantage of thermal cameras is the ability to capture the nighttime activity of bats and nocturnally migrating birds," said Shari Matzner, a senior research engineer at the Pacific Northwest National Laboratory. "Animals are easy to track in thermal video due to their warm bodies."

The researchers are also looking at developing a higher resolution thermal detection system that could differentiate between species, something beyond the capability of radar technologies that estimate how high animals fly around turbines, she said.

Since last May, a team from the Biodiversity Research Institute, a nonprofit that encourages using scientific findings to advance environmental awareness and inform decision makers, has been investigating the technology near a Maine estuary to help software engineers improve the system. While the biologists operate the cameras, they stand behind the equipment and manually record the birds they see, their distance from the devices and their direction of flight. They compare the thermal system's findings to their own observations; note noise from waves, clouds and planes; and check how the cameras perform in various environmental conditions to assess their effectiveness.

"The thermal detection system allows us to collect three-D position information at all times of the day without having to do telemetry," said Andrew Gilbert, data management director with the Biodiversity Research Institute.

The system can capture the size and flight pattern of animals as small as the shorebirds that move along the mudflats and sandbars to feed or roost, Gilbert said, but because the cameras are low-resolution and don't provide



Credit: Dennis Schroeder



Credit: Pacific Northwest National Laboratory

▲ Thermal imagery detects movement, but it can also be detailed enough to allow biologists to identify species.

◀ Researchers are testing a thermal detection system that could be used at offshore wind farms to monitor the movements of birds and bats.

color, the current setup makes it hard to tell the gulls, terns and cormorants apart.

The Biodiversity Research Institute will continue to test the thermal detection system into next year as the Pacific Northwest National Laboratory refines the software and packages the system for use at sea. ■

—Contributed by Julia John



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